



FAA-E-2411
September 29, 1969

DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION SPECIFICATION

ATC BEACON MODIFICATION KITS FOR SPLITTING NON-COMMON DECODERS

1. SCOPE

1.1 Scope.— The equipments specified herein are modification kits for the Air Traffic Control Radar Beacon Ground Station, Indicator Site Equipment, that will provide the changes in this equipment necessary to separate the channels of the non-common decoders for use at multiple operating positions.

1.2 Classification.— Two types and six sizes of modification kits are covered by this specification.

1.2.1 Type.— The following types of modification kits are covered by this specification.

Type I	Modification kits for model ATCBI-2 Indicator Site equipment group
Type II	Modification kits for model ATCBI-3 Indicator Site equipment group

1.2.2 Size.— The following equipment position capacities are covered by this specification.

Size A	4 positions
Size B	8 positions

Size C	12 positions
Size D	16 positions
Size E	20 positions
Size F	25 positions

2. APPLICABLE DOCUMENTS

2.1 FAA documents.- The following FAA specifications and standards, of the issues specified in the invitation for bids or request for proposals, form a part of this specification:

2.1.1 FAA specifications.-

FAA-D-638	Instruction Books, Electronic Equipment
FAA-G-2100/1	Electronic Equipment, General Requirements; Part 1, Basic Requirements for all Equipments
FAA-G-2100/2	Part 2, Requirements for Equipments Employing Electron Tubes
FAA-G-2100/3	Part 3, Requirements for Equipments Employing Semiconductor Devices
FAA-G-2100/4	Part 4, Requirements for Equipments Employing Printed Wiring Techniques
FAA-G-2100/5	Part 5, Requirements for Equipments Employing Microelectronic Devices

2.1.2 FAA standards.-

Advisory Circular No. AC-00-27	U. S. National Standard for IFF MARK X (SIF)/Air Traffic Control Radar Beacon System Characteristics
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2.1.3 FAA equipment modifications.-

a. AF P 6360.1 CHG 9	Chapter 19, Modification of ATCBI-2 non-common decoder for selective mark- ing of Beacon replies
b. AF P 6360.1 CHG 13	Chapter 22, Modification of ATCBI-3 non-common decoder and common A decoder for selective marking of Beacon replies
c. AF P 6360.1 CHG 14	Chapter 23, Modification of ATCBI-3 Non-common Decoder, FA-7251

- d. AF P 6360.1 CHG 15 Chapter 31, Modification of ATCBI-2/3 common "A" Decoder, to deactivate the audible emergency (code 7700) alarm
- e. AF P 6360.1 CHG 27 Corrections and additions to chapter 22

(Copies of the documents under 2.1.1, 2.1.2, and 2.1.3 and other applicable FAA specifications, standards, and drawings may be obtained from the Contracting Officer in the Federal Aviation Administration office issuing the invitation for bids or request for proposals. Requests should fully identify material desired, i.e., specification, standard, amendment, and drawing numbers and dates. Requests should cite the invitation for bids, request for proposals, or the contract involved or other use to be made of the requested material.)

2.1.4 FAA technical manuals.-

- a. Air Traffic Control Beacon Ground Station Model ATCBI-2, Indicator Site Equipment Group. Volumes 1, 2, 3, and Trouble Shooting Manual.
- b. Air Traffic Control Beacon Ground Station Model ATCBI-3, Indicator Site Equipment Group. Volumes 1, 2, 3, 4, and Trouble Shooting Manual.
- c. Air Traffic Control Beacon Ground Station Model ATCBI-3, Patch Cable and Range Switch Modification.

(The above technical manuals are on file for reference purposes in the FAA Library Services Division, Room 930, 800 Independence Ave., S.W., Washington, D. C.)

2.2 Military standards.- The following Military standards, of the issues in effect on the date of the invitation for bids or request for proposals, form a part of this specification:

MIL-STD-461	Electromagnetic Interference Characteristics Requirements for Equipment
MIL-STD-736A	Military Standard Unitized Equipment Design
MIL-STD-756A	Military Standard Reliability Prediction
MIL-STD-781A	Reliability Tests Exponential Distribution
MIL-STD-785	Requirements for Reliability Program

(Information on obtaining copies of Military specifications and standards is given in SUPPLEMENT-1 to FAA-G-2100/1.)

2.3 GSA document.- The following General Services Administration document, of the issue in effect on the date of the invitation for bids or request for proposals, forms a part of this specification, and is applicable to the extent specified hereinafter:

GSA Stock Catalog IL/Part I

(Copies of the GSA Stock Catalog IL/Part I may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.)

3. REQUIREMENTS

3.1 Equipment to be furnished by the contractor.-

3.1.1 Equipment.- The modification kits shall contain all units, subchassis, wiring harnesses, individual wires and cables, components, clamps, grommets, installation hardware, templates for mounting holes, decals, and rubber stamps capable of using paint as the stamp fluid (if required for chassis or circuit board marking) necessary to meet the requirements of the specification. Each modification kit furnished by the contractor shall be complete in accordance with all specification requirements and shall include the major items tabulated below. Any feature or item necessary for proper operation with the requirements of this specification shall be incorporated even though that feature or item may not be specifically described herein.

- a. 1 each Patch Panel Unit
- b. 2 each Code Selection Unit (main and spare)
- c. 1 each Position Amplifier Card Rack Unit
- d. * each Position Amplifier Module
- e. * each Position Control Box
- f. 2 each Power Supply Unit (main and spare)
- g. 1 set Control Transfer Equipment including the following:
 - 1 each control transfer card rack unit
 - 1 set active cards
 - 1 set spare cards
- h. 3 each Buffer sub-chassis

i. 1 each Cabinet Rack

j. * each Non-common decoder rack

* quantity as specified in the contract schedule

3.1.2 Instruction books.- Instruction books shall be furnished in accordance with FAA-D-638 and as specified in the contract schedule. Installation instructions shall be arranged to facilitate installation of the modification kits as specified herein. In addition to complying with paragraph 3.36 of FAA-D-638, Section 4 of the instruction books shall include step-by-step installation instructions, wire routing diagrams where critical, exact location of added components, and instructions for removal of components deleted by the modification. Circuit diagrams and paragraphs of the basic equipment instruction books which are changed as a result of the modifications shall be tabulated. These circuit diagrams shall be redrawn, as modified, and included as part of the modification kit instruction book. Components deleted from the lists of the basic equipment by these modifications shall be tabulated.

3.1.3 Special tools.- All hand tools which are necessary for field maintenance of the equipment shall be itemized in the instruction book. Those necessary tools which are not listed under FSG-51, Hand Tools or FSG-52, Measuring Tools in the GSA Stock Catalog IL/Part I shall be supplied by the contractor with each equipment.

3.1.4 Test equipment list.- All test equipment that is required for field maintenance of the equipment shall be itemized. The itemized list shall be submitted to the Contracting Officer no later than 180 days after award of contract.

3.2 Definitions.-

3.2.1 Service conditions.- The service conditions shall be those of Environment II (1-3.2.23, FAA-G-2100/1). The design center values shall be 120 V AC, 60 Hz.

3.2.2 Pulse measurements.- The following definitions apply when making pulse measurements; reference is made to Drawing A-31054A, attached. These definitions supersede pulse definitions in FAA-G-2100/1, paragraphs 1-3.2.14 through 1-3.2.17.

3.2.2.1 Pulse amplitude.- The pulse amplitude is defined as the amplitude "A" of the equivalent rectangular pulse.

3.2.2.2 Pulse duration.- The pulse duration is defined as the duration "t" of the equivalent rectangular pulse and is the duration of the actual pulse between the 0.5A points on the leading and trailing edges.

3.2.2.3 Pulse rise time.- The pulse rise time is defined as that portion of the total rise time for the pulse to change from 0.1A to 0.9A.

3.2.2.4 Pulse decay time.- The pulse decay time is defined as that portion of total decay time required for the pulse to change from 0.9A to 0.1A.

3.2.2.5 Pulse spacing.- Measurements of spacing between pulses and other time measurements made with a pulse as reference shall be made with reference to the instant the leading edge of each pulse reaches 50 percent (point "h," Drawing A-31054A, attached) of the pulse amplitude.

3.2.3 Interrogation modes.- The interrogation modes consist of two transmitted pulses designated P1 and P3. The interval between P1 and P3, determines the mode of interrogation. Interrogation mode characteristics are described in the U. S. National Standard for the IFF Mark X (SIF)/Air Traffic Control Radar Beacon Systems Characteristics.

3.2.4 Mode interlace.- The present mode interlace circuitry of the interrogator provides for the interlace of three interrogation modes, two interrogation modes, or operation on a single interrogation mode (no interlace) at full beacon sync trigger PRF, with the following interlace patterns provided for three modes (X, Y, and Z) with provisions for X, Y, or Z to be any of the modes 1, 2, 3/A, B, C, or D:

- a. No interlace - Continuous interrogation on X
- b. No interlace - Continuous interrogation on Y
- c. No interlace - Continuous interrogation on Z
- d. X, Y, X, Y, etc.
- e. X, Y, Z, X, Y, Z, etc.
- f. X, X, Y, X, X, Y, etc.
- g. X, Y, X, Z, X, Y, X, Z, etc.

3.2.5 Reply codes.- The reply codes contain two framing or bracket pulses, from zero to a maximum of 13 information pulses, and a special identity (Ident.) pulse. The reply pulse train in response to a particular interrogation mode shall be at the same rate and synchronous with interrogations on that mode. The reply code characteristics are described in the U. S. National Standard for the IFF Mark X (SIF)/Air Traffic Control Radar Beacon Systems Characteristics.

3.2.4 Ripple voltage.- Ripple voltage is referred to as the peak-to-peak value of a simple or complex waveform consisting of power line frequency components and harmonics thereof, and synchronous and repetitive non-synchronous transients.

3.3 General requirements.- The basis of overall equipment design shall be the achievement of maximum operation reliability and ease of servicing.

The modification kit shall modify the existing ATCBI-2 (Type I) and ATCBI-3 (Type II) decoding equipment to be configured and operate as follows:

- a. Two non-common decoders shall be connected and modified to provide 20 channels of independently selectable beacon reply code data.
- b. The decoder output data shall feed a patch panel for interconnection of the reply code data to feed up to 25 PPI or RBDE positions.
- c. Each of the PPI/RBDE positions shall be able to patch into any 12 of the available 20 channels of beacon reply code data.
- d. Each PPI/RBDE position shall have the capability to select from the available modes for display, and independently select single slash, double slash, and "ident" video for display.

3.3.1 Solid-state devices.- The contractor shall design the circuitry of the equipment around solid-state devices insofar as possible and shall not use vacuum tube circuitry or relays without the written permission of the Contracting Officer.

3.3.1.1 Microelectronic circuits.- Maximum usage shall be made of micro-electronic integrated circuits as determined by design requirements.

3.3.2 Modular construction.- Plug-in solid-state modules shall be used to the maximum extent practicable.

3.3.3 Radiation interference and susceptibility.- The design and construction of circuits, shielding, and filtering of the added units shall be such as to meet the radiated and conducted emanations and the susceptibility requirements of MIL-STD-461 for Class ID equipment. The tests performed shall be as listed in Table II of MIL-STD-461 for Class ID equipment.

3.3.4 Reversibility.- The equipment shall incorporate features such that it is mechanically or electrically impossible to install incorrectly its modules, circuit card assemblies, and subassemblies.

3.3.5 Mounting.- All units shall be constructed on pullout drawers or hinged swingout bays mounted on sliding drawer channels. Each drawer assembly may be provided with chassis slides of the tilt-detent type with locking positions for servicing. Adjustments shall be accessible with the drawer(s) pulled out. Cable assemblies shall be long enough for the drawers to be fully extended and tilted without removing the assembly from

operation. Handles shall be provided on the front of each pullout drawer to facilitate its removal from the cabinet.

3.3.6 AC input.- Each equipment cabinet shall be provided with AC power input terminals. The equipment shall not be connected to the AC power ground. (Modifies FAA-G-2100/1, paragraph 1-3.6)

3.3.7 Ground connectors.- A ground stud shall be provided for connecting each unit to an external ground.

3.4 Position amplifier card rack unit.- The card rack unit shall accept all input and output connectors and terminals. It shall house the quantity and type of module specified in paragraph 3.4.1 herein.

3.4.1 Module capacity.- The card rack unit shall have the capacity to house the following quantity of active and spare modules:

<u>Nomenclature</u>	<u>Active Quantity</u>	<u>Spare Quantity</u>
Position Amplifier	25	1

3.5 Power supply unit.- Each power supply unit shall have the capacity to simultaneously operate the maximum quantity of active modules (3.4.1) and all other units of the modification kit.

3.5.1 Ripple voltage.- Peak-to-peak value of ripple voltages shall not exceed 0.1% of the DC power supply voltage for all electronically-regulated power supplies.

3.5.2 Power supply indicators.- Each circuit protected by a fuse or circuit breaker shall have an indicator lamp which shall be illuminated when the fuse or circuit breaker is open. Neon indicator lamps shall be used whenever possible. All indicator lights shall be uniformly located with respect to the associated fuses or circuit breakers, or they may be an integral part of the fuse holder assembly.

3.6 Position amplifier module.- The position amplifier module shall accept twelve channels of reply code data from the patch panel unit. The module shall process the data under the control of the position control box. It shall furnish single slash, double slash, and "ident" video data to the PPI. The space between the double slash code selected at each position shall be corrected for the radar range used at that PPI or RBDE position.

3.7 Patch panel unit.- The patch panel unit shall accept the 20 channels of reply code data from the non-common decoders. The patch panel unit shall provide the patching and isolation necessary to patch any channel of the reply code data to as many as 25 position amplifier modules simultaneously. Each position amplifier module shall be capable of being patched in to any 12 channels of reply code data.

3.8 Code selection unit.- Each code selection unit shall contain mounting provisions for two control boxes (Control Box #1 and Control Box #2). It shall be marked to provide channel identification (Channels #1 through #20) of the two control boxes. Control Box #1 and Control Box #2 shall control non-common decoder #1 and non-common decoder #2, respectively. The control boxes themselves shall not be modified. The code selection unit shall accept any mixture of the listed control boxes within each TYPE of modification kit.

TYPE I	TYPE II
<u>Control Boxes</u>	<u>Control Boxes</u>
FA-6196A	FA-7260
FA-6196B	FA-7261
FA-6196C	FA-7262

3.9 Position control box.- The position control box shall be interconnected with the position amplifier module to control the information being sent to the PPI/RBDE.

3.9.1 Construction.- The box shall be not larger than the existing master control box, FA-7261, and shall be made with provisions to fit the same mounting hole. It shall contain twelve sets of "code channel" switches, one for each channel. The channels shall be marked to provide channel identification (Channels #1 through #12). Each channel shall be provided with a lighted "code identification" space suitable for use with a grease pencil adjacent to each channel control switch. It shall contain the following sets of "two level lighted" square pushbutton switches:

- a. 1 set bracket code switches
- b. 12 sets code channel switches

It shall contain the following square indicator lights:

<u>Nomenclature</u>	<u>Color</u>
a. Range Error	Red
b. Emergency	Red

All controls on the box shall be lighted. Active electronic components shall be held to the absolute minimum in the position control box.

3.9.2 Operation.- The range error and emergency indicators shall be lighted upon receipt of the proper signal from the common decoder equipment. The code channel switches shall allow the following PPI or RBDE display for each channel of reply code data:

<u>Switch Position</u>	<u>Display</u>
a. Double Slash	double slash plus ident bloom
b. Single Slash	single slash
c. OFF	nothing

The Bracket Decode switch shall allow the following PPI or RBDE display:

<u>Switch Position</u>	<u>Display</u>
a. ALL	single slash on modes 1, 2, 3/A, and C*
b. 3/A	single slash on mode 3/A
c. OFF	nothing

*Type I equipment shall be modified by the contractor to substitute mode C for the existing mode B.

3.10 Control transfer equipment.-

3.10.1 Control transfer card rack unit.- The card rack unit shall accept all input and output connectors and terminals. It shall house the quantity and type of modules required to perform the control transfer functions specified in paragraph 3.10.2 herein. The card rack unit shall also house a complete set of spare modules.

3.10.2 Control transfer modules.- The control transfer modules shall be mounted in the control transfer card rack unit. The control transfer modules shall contain all wiring, semi-conductor devices, switches, and other components required to interface the following:

- a. The spare non-common decoder with either the non-common decoder #1 or non-common decoder #2
- b. The spare control boxes #1 and #2 with the main control boxes #1 and #2, respectively.

Changeover from the active modules to the spare modules shall be accomplished by installing the spare modules in place of the active modules. The two sets of control transfer modules shall contain the following sets of switches:

- c. Spare decoder
 - (1) #1
 - (2) off
 - (3) #2

d. Control box

(1) channel A

(2) channel B

e. Maintenance/operate

The two sets of control transfer modules shall contain the following square indicator lights:

f. Maintenance enable

g. No control

3.10.3 Remote control.- The control transfer equipment shall include provisions for remote control of the switching functions specified in paragraph 3.10.2 herein. The remote control panel shall not be provided (the remote control feature is intended as a future system capability).

3.11 Buffer sub-chassis.- Modification circuitry shall be incorporated into each non-common decoder to provide 10 channels of buffered reply code data to the patch panel unit (3.7). The circuit components of the non-common decoder modification that cannot be incorporated into the original chassis configuration shall be installed in a single sub-chassis.

3.12 Non-common decoder rack.- The cabinet rack shall contain all wiring and terminal boards necessary to accept a spare non-common decoder and its associated power supply plus approximately 35 inches of blank panel space. The rack shall not exceed 76 inches in overall height, 26 inches in overall depth, and 25 inches in overall width. All access shall be through the front and rear of the rack so that it may be installed with other racks abutted against the sides of this rack. Cables egress shall be through the top of the rack. The rack shall be provided with a grounding terminal and convenience outlets. Illumination of the interior of the cabinets shall be provided through the use of tubular incandescent lamps. Lights shall be located to illuminate components, chassis, and areas behind the vertical chassis to facilitate maintenance. Lamps shall be mounted in such a position that the possibility of accidental physical damage is minimized. The rack shall include a voltage regulator, to be furnished by the contractor, to regulate the AC input to the non-common decoder.

3.13 Cabinet rack.- A cabinet rack shall be provided for installation of the following units:

a. Patch Panel Unit

b. Code selection units

c. Position amplifier card rack unit

d. Power supply units

e. Control transfer equipment

The rack shall not exceed 76 inches in overall height, 26 inches in overall depth, and 25 inches in overall width. All access shall be through the front of the rack so that the rear of the rack may be installed against a wall and other racks abutted against the sides of this rack. Cables egress shall be through the top of the rack. Each pullout drawer shall be removable from the cabinet without requiring partial or complete removal of any adjacent unit from the cabinet. Units may be integral parts of pullout drawer assemblies. Adjustments shall be accessible with the drawer(s) pulled out. Cable assemblies shall be long enough for the drawers to be fully extended without removing the assembly from operation. Handles shall be provided on the front of each pullout drawer to facilitate its removal from the cabinet. Equipment layout and design shall provide maximum accessibility for maintenance and repair of units. The rack shall be provided with a grounding terminal and convenience outlets. Illumination of the interior of the cabinets shall be provided through the use of tubular incandescent lamps. Lights shall be located to illuminate components chassis and areas behind the vertical chassis to facilitate maintenance. Lamps shall be mounted in such a position that the possibility of accidental physical damage is minimized.

3.14 Spare unit cables.— Cables shall be provided for patching in any one of the non-common decoders with its associated power supply to any one of the standby control boxes for maintenance testing of the units, when the units are mounted in an adjacent rack configuration.

3.15 Equipment position capacity.— The equipment shall be wired for the following SIZES of equipment position capacity as specified in the contract schedule.

	<u>Capacity of Position Amplifier Card Rack Unit (3.4)</u>		<u>Capacity of Patch Panel Unit (3.7)</u>
	<u>Active</u>	<u>Spare</u>	
Size A	4	1	4
Size B	8	1	8
Size C	12	1	12
Size D	16	1	16
Size E	20	1	20
Size F	25	1	25 •

3.16 Reliability/maintainability.—

3.16.1 Reliability.— The added equipment shall have a Minimum Acceptable Mean-Time-Between-Failure (θ_1) of 150 hours, where θ_1 is defined by MIL-STD-781A. The design prediction reliability (3.16.1.3) of the equipment shall be 5,000 hours MTBF.

3.16.1.2 Reliability programs.- The reliability requirements shall be accomplished through a reliability program plan in accordance with MIL-STD-785. The reliability program plan shall be submitted to the Contracting Officer for approval 60 days after award of contract.

3.16.1.3 Reliability prediction.- A design reliability prediction shall be made using the methods contained in paragraph 5.2, MIL-STD-756.

3.16.1.4 Reliability demonstration.- The reliability of the added equipment shall be demonstrated in accordance with paragraph 4.2.3 of MIL-STD-781A. The reliability tests shall be performed in accordance with Test Level A-1, Test Plan XXV of MIL-STD-781A.

3.16.2 Maintainability.- All electronic and mechanical equipment and parts shall be designed and fabricated to minimize the skill, experience, and time necessary to assemble and maintain them. Corrective maintenance shall use a remove-and-replace philosophy with actual repair to the replacement module to be accomplished later in a separate maintenance area.

4. QUALITY ASSURANCE PROVISIONS

4.1 General requirements for quality control, inspection, and tests.- See Section 1-4 of FAA-G-2100/1.

4.2 Required tests.- The contractor shall submit for approval in accordance with 2.2.1 of FAA-STD-013, four copies of a comprehensive test plan including a list of tests specified in 1-4.2 of FAA-G-2100/1. The Government reserves the right to require any additional tests necessary to assure that all of the specification requirements are checked. Design qualification tests on the decoding equipment incorporating these modifications shall include such one-time (design-qualification) items covered in the basic equipment tests as might be affected by the modifications incorporated under this specification plus tests to demonstrate compliance with the additional performance requirements introduced by this specification. The contractor shall incorporate all the developed modification circuitry in one of the non-common decoders. Design qualification tests shall be performed on these installed modifications and successfully passed to the satisfaction of the FAA. The installation of the modification in kit form as delivered to the field shall be demonstrated to the satisfaction of the FAA using the remaining non-common decoder. The practicability of field installation, adequacy of installation instructions, and compliance with the requirements of all design qualification tests shall be demonstrated prior to acceptance by the FAA of any of the kits. Such successful demonstration to the satisfaction of the FAA shall complete the design qualification test requirement.

5. PREPARATION FOR DELIVERY

5.1 General packing requirements.- See FAA-G-2100/1, paragraph 1-5.1.

6. NOTES

6.1 Note on information items.- The contents of the subparagraphs below are only for the information of the initiator of the procurement requests and are not a part of the requirements of this specification. They are not contract requirements, nor binding on either the Government or the contractor. In order for these terms to become a part of a resulting contract, they must be specifically incorporated in the schedule of the contract. Any reliance placed by the contractor on the information in these subparagraphs is wholly at the contractor's own risk.

6.1.2 GFE for kit installations.- The contract schedule should include the fact that the Government will furnish the following equipment for use by the contractor in the fabrication and testing of the modification kit:

Type I

<u>Quantity</u>	<u>Nomenclature</u>
a. 2 each	Non-Common Decoder, Type FA-6194
b. 2 each	Non-Common Power Supply, Type FA-6195
c. 2 each	Control Box, Type FA-6196A, Type FA-6196B, or Type FA-6196C

Type II

<u>Quantity</u>	<u>Nomenclature</u>
d. 2 each	Non-Common Decoder, Type FA-7251
e. 2 each	Non-Common Decoder Power Supply, Type FA-7252
f. 2 each	Control Box, Type FA-7260, Type FA-7261, or Type FA-7262

The contract schedule should also include the following requirements: Upon receipt of the decoding equipment, it shall be adjusted by the contractor for peak system performance and critical performance data recorded for use as a reference in determining changes in system performance as a result of installation of the modification kit. The kit shall be installed in the Government-furnished equipment by the contractor in the process of kit testing.

6.1.2 Equipment types.- The contract schedule should specify the quantity of each type of modification kit to be furnished either individually or in any combination:

- a. Type I modification kit (for ATCBI-2 decoders)
- b. Type II modification kit (for ATCBI-3 decoders)

One type I or one type II modification kit is required for each Beacon System which is to be modified.

The contract schedule should specify the quantity of each size of modification kit to be furnished either individually or in any combination with type I or II above:

- c. Size A 4 positions
- d. Size B 8 positions
- e. Size C 12 positions
- f. Size D 16 positions
- g. Size E 20 positions
- h. Size F 25 positions

The SIZE of the modification equipment will determine the maximum number of Radar Sectors that can be used with each Beacon System. The contract schedule should specify the quantity of Position Amplifier Modules, Position Control Boxes, and non-common decoder racks to be furnished.

- i. Position Amplifier Module (3.6)
- j. Position Control Box (3.9)
- k. Non-common decoder rack (3.12)

One Position Amplifier Module is required for each Radar Sector plus one spare module for each type I or type II modification kit. One Position Control Box is required for each Radar Sector.

One non-common decoder rack is required for each type I or type II modification kit which released an odd quantity of non-common decoders.

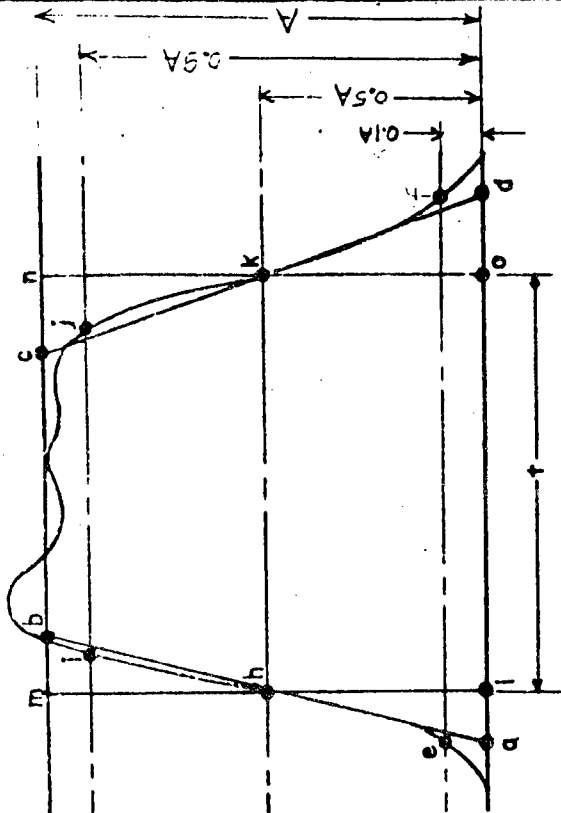
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Attachment: Drawing A-31054A

CONSTRUCTION OF EQUIVALENT RECTANGULAR AND TRAPEZOIDAL PULSE SHAPES

1. BY SUCCESSIVE APPROXIMATION OBTAIN RECTANGULAR PULSE (AMPLITUDE A) OF AREA EQUAL TO AREA UNDER ACTUAL PULSE AND PASSING THROUGH THE 0.5A POINTS (h, k.) ON THE ACTUAL PULSE ENVELOPE. THIS IS RECTANGLE i m n o.
2. CHOOSE POINTS e f AND l j ON THE ACTUAL PULSE AT 0.1A AND 0.9A LEVELS RESPECTIVELY.
3. THROUGH h DRAW a h b PARALLEL TO A STRAIGHT LINE CONNECTING e AND l. THROUGH k DRAW d k c PARALLEL TO A STRAIGHT LINE CONNECTING f AND j. THEN EQUIVALENT TRAPEZOIDAL PULSE a b c d.

NOTE: AREA a b c d = AREA OF RECTANGLE.
= AREA OF PULSE.



A	10/12/67	REV. LTR.	DATE	REV. TITLE BLOCK	CHECKED	APPROVED
DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION WASHINGTON, D. C. 20590						
PULSE SHAPE PARAMETERS						
SUBMITTED BY <i>FAB 4</i> ELECTRONIC STANDARDS SECTION APPROVED BY <i>W. J. J.</i> CHIEF, SYSTEMS STANDARDS BRANCH ISSUED BY SYSTEMS RESEARCH AND DEVELOPMENT SERVICE DATE 10/12/67 DRAWING NO. A-31054 ENVIRONMENTAL DEVELOPMENT DIVISION						
DESIGNED BY T. D. DRAWN BY J. L. S. CHECKED BY K. A. J.						

